REMARKS

Claims 23, 32, 40 and 63-67 are pending in this application. In this Amendment, claims 40 and 67 have been amended only for better form. Care has been exercised to avoid the introduction of new matter.

Claims 40 and 67 have been rejected under 35 U.S.C. §101.

The Examiner pointed out that claims 40 and 67 are directed to "a recorded medium" which does not necessarily invoke a "computer readable medium," and thus, is considered as non-functional descriptive material.

In response, claims 40 and 67 have been amended to recite a computer readable recording medium, respectively. Accordingly, the claims are now directed to statutory subject matter, and withdrawal of the rejection of claims 40 and 67 is respectfully solicited.

Claims 23, 32, 40, 63-64 and 67 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Wober et al. in view of Linares. [1]

In the statement of the rejection, the Examiner admitted that Wober et al. does not explicitly teach nonlinear interpolation, although the reference teaches using interpolation to enlarge an image. However, the Examiner applied Linares, and asserted that using nonlinear interpolation is well known in the art. The Examiner then concluded that it would have been obvious to modify Wober's device based on the teachings of Linares. This rejection is respectfully traversed.

[1] Applicants presume that claim 66 has also been rejected under 35 U.S.C. §103(a) for obviousness predicated upon Wober et al. in view of Linares according to the fourth full paragraph on page 4 of the Office Action.

Applicants submit that the Examiner has not established a *prima facie* basis to deny patentability to the claimed invention under 35 U.S.C. §103 for lack of the requisite factual basis. To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Wober et al. and Linares, either individually or in combination, do not teach, among other things, estimating frequency components of an enlarged image by performing interpolation on the frequency components of an original image (the frequency domain), and performing inverse transformation of the frequency components of the enlarged image, as recited in independent claims 23, 32, 40, 63, 66 and 67. Claims 23 and 63 recite the enlarged frequency estimating means and the inverse orthogonal transform means, and claims 32, 40, 66 and 67 recite the enlarged frequency estimating step and the inverse orthogonal transforming step.

First, Wober et al. discloses that interpolation is performed in the spatial domain, whereas the claimed invention performs interpolation in the frequency domain.

Wober describes the term "interpolation" as follows: "Interpolation is typically provided in the spatial domain in the form of linear interpolation. Interpolation or increasing the number of reconstructed image data points s'(y, x) can be accomplished in the hybrid IDCT processor 62 ..." (column 14, lines 28-32) (emphasis added). Therefore, it cannot be said that the interpolation in Wober et al. teaches estimation of the interpolation in the frequency domain.

Second, the claimed invention inverse-transforms the frequency components of an enlarged image, whereas Wober et al. inverse-transforms the frequency components of an original image to obtain an enlarged image (see paragraph 8, line 45 to paragraph 14, line 53 of Wober et al.).

For example, equation (6) of Wober et al. teaches that the frequency components of an original image are inverse-transformed to obtain an enlarged image (reconstructed image). This is so because S(v, u) in equation (6) is the frequency components of an original image in which "v" and "u" correspond to an original image. S(v, u) can be obtained by equation (3) of Wober et al. S'(y, x) in equation (6) indicates an enlarged image in the spatial domain.

Further, the frequency components are inverse-transformed by two-time matrix calculations, as shown in Fig. 3 of Wober et al. Applicants specifically note that this inverse transformation does not mean that interpolation is performed in the frequency domain to obtain an enlarged image in the first calculation, and the enlarged image is inverse-transformed in the second calculation in the two-time matrix calculations of Wober et al. The two-time matrix calculations are needed only because the image is two-dimensional data. According to equation (6), first and second calculations are performed on an original image, not an enlarged image. Accordingly, in the two-time matrix calculation of *Wober et al., the original image is inverse-transformed for enlargement in one direction in the first calculation, and the image is inverse-transformed for enlargement in another direction in the second calculation. The first and second calculations are mathematically the same.

If it is assumed that data is one-dimensional, calculation based on equation (6) on such data is performed only once. It is apparent that in this calculation, an original image is not enlarged before it is inverse-transformed. The two-time matrix calculations in Wober et al. merely mean that such one-dimensional data calculation is performed twice.

Third, the claimed invention performs interpolation in the frequency domain, but does not inverse-transform an image to perform interpolation of the image, while Wober et al. enlarges an

image by a hybrid IDCT in which an image is inverse-transformed when it is enlarged. The hybrid IDCT is described in column 4, lines 25-27.

In the statement of the rejection, the Examiner asserted that because Wober et al. discloses "interpolation for enlarging image mentioned in col. 4 lines 21-22," the reference teaches the claimed enlarged frequency estimating means, and Wober et al. teaches "the inverse discrete cosine transforms (DCT) mentioned in col. 4 lines 25-27" which corresponds to the claimed inverse orthogonal transform means (see paragraph 6 of the Office Action). However, the Examiner's position is unreasonable. Since image enlargement is performed by the hybrid IDCT in Wober et al., an image is inverse-transformed when it is enlarged. According to the Examiner's position, the image inverse-transformed is again inverse-transformed. Wober et al. does not teach such calculations.

Accordingly, Wober et al. does not disclose estimating frequency components of the enlarged image by performing interpolation on the frequency components of the original image, and performing the inverse transformation of the frequency components of the enlarged image, as recited in independent claims 23, 32, 40, 63, 66 and 67.

The secondary reference, Linares, also fails to teach estimating the frequency components by non-linear interpolation on the frequency components of the enlarged image, and acquiring the enlarged image by performing the inverse transformation on the frequency components of the enlarged image.

Linares relates to a method of reducing distortion of a JPEG image. A compressibility error between an original image and a compressed image is adaptively estimated, which can reduce the distortion of the decompressed image. A DCT component image is enlarged to estimate the bandwidth in coding (see Fig. 1). Figs. 3(a) and 3(c) of Linares show 64 x 64 DCT

component images on the vertical frequency direction and on the horizontal frequency direction, respectively. Figs. 3(b) and 3(d) show an interpolated vertical frequency image and an interpolated horizontal frequency image, respectively, which are enlarged by eight times by the interpolation (column 5, lines 47-51).

Linares does not describe the non-linear interpolation, but describes only the spatial interpolation (column 3, lines 62-64). In order to adaptively estimate components lost by the compression, Linares needs a large amount of calculation. If the non-linear interpolation is performed, there is a possibility that the calculation amount will increase more than the linear interpolation.

Since Linares intends to reduce the distortion, it does not mandate to allocate most of the calculation amount only to the enlargement of the DCT component image. In addition, Linares does not obtain the enlarged image by performing the inverse transform of the enlarged DCT component image.

Based upon the foregoing, Applicants submit that the Examiner has not established a *prima facie* basis to deny patentability to the claimed invention for lack of the requisite factual basis. The applied combination of Wober et al. and Linares fails to teach estimating the frequency components of the enlarged image by performing the non-linear interpolation of the frequency components of the original image, and acquiring the enlarged image by performing the inverse transform of the frequency components of the enlarged image, as recited in independent claims 23, 32, 40, 63, 66 and 67. According to the claimed invention, the non-linear interpolation makes it possible to reflect features of the frequency components of the original image on the enlarged image precisely. It is noted that dependent claim 64 is also patentably distinguishable over the applied combination of Wober et al. and Linares at least because the

claim includes all the limitations recited in independent claim 63. Applicants, therefore, submit that the imposed rejection of claims 23, 32, 40, 63, 64, 66 and 67 under 35 U.S.C. §103 for obviousness predicated upon Wober et al. in view of Linares is not factually or legally viable and, hence, solicit withdrawal thereof.

Claims 65 has been rejected under 35 U.S.C. §103(a) as being unpatentable over Wober et al. in view of Linares and further in view of Pawlicki et al.

In response, it is submitted that claim 65 is patentably distinguishable over the applied combination of Wober et al., Linares and Pawlicki et al. at least because the claim includes all the limitations recited in independent claim 63. Specifically, Pawlicki et al. discloses that an image is enlarged by interpolating on the spatial domain using a neutral network. Pawlicki et al., as well as Wober et al. and Linares, fails to teach the non-linear interpolation on the frequency domain, as recited in claim 63. Applicants, therefore, respectfully solicit withdrawal of the rejection of claim 65 under 35 U.S.C. §103, and favorable consideration thereof.

Conclusion

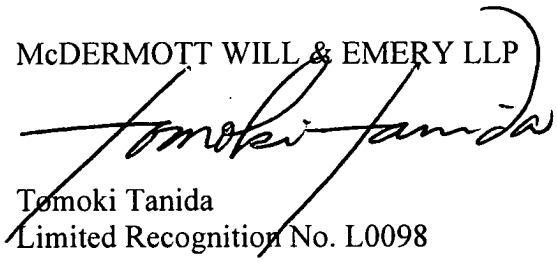
It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper,

including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



Tomoki Tanida
Limited Recognition No. L0098

600 13th Street, N.W.
Washington, DC 20005-3096
Phone: 202.756.8000 SAB:TT:lnm
Facsimile: 202.756.8087
Date: January 5, 2006

Please recognize our Customer No. 20277 as our correspondence address.

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